1.4 Surface Areas of Other Objects
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SOLUTIONS

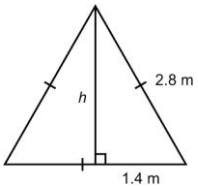
3. d) The area of overlap is 2 times the area of one face of the cube.

Surface area = surface area of triangular prism + area of 6 faces of cube – area of 2 faces of cube
= surface area of triangular prism + area of 4 faces of cube
$= (2 \times \frac{1}{2} \times 9 \times 12) + (15 \times 6) + (9 \times 6) + (12 \times 6) + (4 \times 3 \times 3)$
$= 360$
The surface area of the composite object is 360 cm^2.

e) The area of overlap is 2 times the area of one face of the cube.

Surface area = surface area of triangular prism + area of 6 faces of cube – area of 2 faces of cube
= surface area of triangular prism + area of 4 faces of cube
= 2 × area of triangular base + area of 3 rectangular faces + area of 4 faces of cube
$= (2 \times \frac{1}{2} \times 5 \times 12) + (6 \times 13) + (6 \times 5) + (12 \times 6) + (4 \times 2 \times 2)$
$= 256$
The surface are of the composite object is 256 cm^2

5. b)



Height, h, of the triangular base:
$h^2 + 1.4^2 = 2.8^2$
$h^2 = 2.8^2 - 1.4^2$
$= 5.88$
$h = \sqrt{5.88}$
$\doteq 2.42$
The overlap is two times the area of one rectangular face of the triangular prism.

Surface area = 2 × area of triangular base + area of one rectangular face of triangular prism + surface area of rectangular prism
$\doteq (2 \times \frac{1}{2} \times 2.8 \times 2.42) + (1.2 \times 2.8) + (2 \times 1.4 \times 4.8) + (2 \times 1.4 \times 2.8) + (2 \times 4.8 \times 2.8)$
$\doteq 58.3$
The surface area of the composite object is about 58.3 cm^2.

7. a) Surface area = 2 × area of triangular base + area of 2 rectangular faces of triangular prism + 2 × area of front face of rectangular prism + 2 × area of side face of rectangular prism + area of base of rectangular prism
$= (2 \times \frac{1}{2} \times 2.0 \times 0.75) + (2 \times 1.25 \times 3.0) + (2 \times 3.0 \times 2.0) + (2 \times 2.0 \times 2.0) + (3.0 \times 2.0)$

= 35

The surface area of the playhouse is 35 m^2.

Note: The surface area does not need to include the base. In this case, the surface area of the playhouse is 29 m^2.

b) Answers will vary.

One possible answer is to have a door with width 0.75 m and height 1.5 m, and two square windows, 0.7 m by 0.7 m. If the playhouse was being painted or covered with siding, then the surface area would be reduced by the sum of the areas of the door and windows.

c) Answers will vary.

Surface area = total surface area of the playhouse – area of door – area of windows

= 35 – (0.75 × 1.5) – (2 × 0.7 × 0.7)

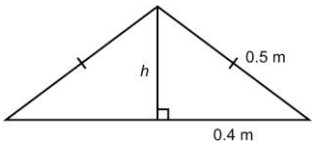
≐ 32.9

The surface area would be about 32.9 m^2.

Note: If we start with a total surface area of 29 m^2 (which does not include the base), then the surface area is about 26.9 m^2

8. a) The doghouse is composed of a triangular prism atop of a rectangular prism.

Height, *h*, of the triangular base:



$h^2 + 0.4^2 = 0.5^2$

$h^2 = 0.5^2 - 0.4^2$

$= 0.09$

$h = \sqrt{0.09}$

$= 0.3$

Since this is a house, do not include the base in the calculation. Also, include 4 times the area of the overhang, since there are 2 overhangs, and each one has a top side and an underside.

Surface area = (surface area of sides of rectangular prism – area of doorway) + 2 × area of triangular base + area of 2 rectangular faces of triangular prism + 4 × area of overhang

$= ((2 \times 0.8 \times 1.5) + (2 \times 0.8 \times 0.8) - (0.6 \times 0.5)) + (2 \times \frac{1}{2} \times 0.8 \times 0.3) + (2 \times 0.5 \times 1.5) + (4 \times 1.5 \times 0.1)$

= 5.72

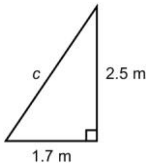
The surface area of the doghouse is 5.72 m^2.

b) Enough stain is needed to cover twice the surface area.

2 × 5.72 m^2 = 11.44 m^2

Since a 1-L can covers 6 m^2, 2 cans of 1-L wood stain are needed

12. a) The canvas of the trailer is composed of two triangular prisms and one rectangular prism.
Determine the unknown length, c, of the triangle:



$c^2 = 2.5^2 + 1.7^2$
$c^2 = 9.14$
$c = \sqrt{9.14}$
$\doteq 3.02$
Assume the top of the trailer is canvas.
Surface area = 4 × area of triangle base + 2 × area of rectangular face of triangular prism + 2 × area of front face of rectangular prism + area of top face of rectangular prism

$$\doteq (4 \times \frac{1}{2} \times 1.7 \times 2.5) + (2 \times 3.02 \times 2.5) + (2 \times 5 \times 2.5) + (5 \times 2.5)$$

$= 61.1$
The surface area of the canvas on the trailer is 61.1 m^2.

b) Yes, the surface area of canvas will increase. The material must be elastic and stretch. The distance from the top of the tent trailer to the bottom of the overhang was approximately 3.0 m.
It was a straight line segment. With the insertion of the bars it is now two lines segments. The shortest distance between two points is a straight line segment. Since it is now two line segments, the distance between the two points must be longer so there must be more area.